UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/535,311	05/18/2005	Masakazu Funahashi	28955-1050	5735

27890 7590 07/16/2010

STEPTOE & JOHNSON LLP
1330 CONNECTICUT AVENUE, N.W.
WASHINGTON, DC 20036

EXAMINER	
YAMNITZKY, MARIE ROSE	
ART UNIT	PAPER NUMBER
1786	
MAIL DATE	DELIVERY MODE
07/16/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/535,311	FUNAHASHI ET AL.	
	Examiner	Art Unit	
	Marie R. Yamnitzky	1786	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 May 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3,5-8,10-13,26-34 and 37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *3,5-8,10-13,26-34 and 37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. This Office action is in response to applicant's amendment filed May 21, 2010, which amends claims 3, 5-8, 10, 11 and 13, cancels claims 35 and 36, and adds claim 37.

Claims 3, 5-8, 10-13, 26-34 and 37 are pending.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 3, 5-8, 10-13, 26-34 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai et al. (US 2002/0136922 A1) with evidence provided by Hosokawa et al. (US 7,087,322 B2).

Sakai et al. provide examples of organic electroluminescent devices comprising a light-emitting layer between a pair of electrodes wherein the light-emitting layer comprises a combination of three materials: Sakai's bisanthracene compound 6-1, which is a phenylanthracene derivative similar to present applicant's compound H1 and meets the limitations recited in claims 7, 8, 10, 11, 30, 31 and 32, DPVDPAN, which is a condensed aromatic ring compound and is present applicant's compound H2 and meets the limitations recited in claims 5, 7 and 28, and DMPAVB, which is a styrylamine derivative and is present applicant's compound D1 and meets the limitations recited in claims 5, 7 and 28. See Sakai's

examples 1 and 2 (pages 8-9). The devices of these examples further comprise a layer between the light emitting layer and the anode which meets the limitations recited in claims 13 and 34.

With respect to the three materials in the light emitting layer of Sakai's examples 1 and 2, the examiner compares compound 6-1 to the presently required light-emitting-layer material, DPVDPAN to the presently required first dopant, and DMPAVB to the presently required second dopant.

Sakai et al. do not explicitly disclose the valence electron level, conduction level or energy gap of the three materials. However, based on Sakai's teachings as well as the data set forth in Table 1 of the present specification, and the data set forth in Table 1 of the patent to Hosokawa et al., it is reasonable to expect that the combination of materials used in Sakai's Examples 1 and 2 inherently meets most of the relations set forth in the present claims as described below. With respect to Hosokawa's data, ionization energy correlates to valence electron level and electron affinity correlates to conduction level. Energy gap is the difference between valence electron level/ionization energy and conduction level/electron affinity. Hosokawa's compound E2 is Sakai's compound 6-1. Hosokawa also provides data for several other compounds that are disclosed in the present specification (for example, Hosokawa's compound E1 is applicant's compound H2, and Hosokawa's compounds D2 and D4 are applicant's compounds D2 and D3, respectively). Although Hosokawa's values differ slightly from those set forth in the present specification for the same compounds, the values are sufficiently close such that Hosokawa's data concerning compound E2 can be used to reasonably

establish that Sakai's combination of compound 6-1, DPVDPAN and DMPAVB meets most of the relations set forth in the present claims.

With respect to energy gap, Sakai et al. teach in paragraph [0028] that it is preferred that the compound of Sakai's general formula (2) have a greater energy gap than the energy gap of the light-emitting material of Sakai's general formula (1), and teach in paragraph [0036] that a fluorescent molecule may be used in combination with the other two compounds and preferably has an energy gap that is smaller than that of the light-emitting material, thus suggesting the relationship of EG0>EG1 and EG0>EG2. Further, given the data provided in the specification and the data provided in the patent to Hosokawa et al., it is reasonable to expect that the combination of three materials used in the light emitting layer of Sakai's Examples 1 and 2 inherently meets relation (C') of present claim 26 and dependents, and inherently meets relation (C) of present claim 37 and dependents. Based on the data provided in the present specification, DPVDPAN has an energy gap of 2.9 and DMPAVB has an energy gap of 2.8, and based on the data provided in the patent to Hosokawa et al., Sakai's compound 6-1 has an energy gap that is greater than the energy gap of DPVDPAN and DMPAVB. Further, given Sakai's disclosure, it is reasonable to expect that both DPVDPAN and DMPAVB in Sakai's Examples 1 and 2 emit light as per present claims 3 and 27.

Given the data provided in the specification and the data provided in the patent to Hosokawa et al., it is also reasonable to expect that the combination of three materials used in the light emitting layer of Sakai's Examples 1 and 2 inherently meets relation (A') of present claim

26 and dependents and inherently meets relation (A) of present claim 37 and dependents, and meets the limitations recited in claims 6 and 29.

With respect to present claims 26, 37 and dependents, Sakai's devices of Examples 1 and 2 do not meet the dopant concentration limitation set forth in the last two lines of claims 26 and 37, do not fully meet relation (B') as set forth in claim 26 and relation (B) as set forth in claim 37, and do not meet the further limitations of claims 12 and 33.

Regarding the dopant concentration, DMPAVB is used in Sakai's Examples 1 and 2 in an amount of 3% by weight of the layer. However, DPVDPAN is used in an amount of about 69% based on the weight of the layer in Example 1, and in an amount of about 48% based on the weight of the layer in Example 2. However, making similar devices having lesser amounts of DPVDPAN would have been an obvious modification to one of ordinary skill in the art at the time of the invention given, for example, Sakai's teachings in paragraphs [0015] and [0033]. DPVDPAN is a compound of Sakai's light emitting material of general formula (1). The teachings in paragraph [0033] suggest lower amounts of DPVDPAN than used in Examples 1 and 2, and even lower amounts are suggested by Sakai's teaching in paragraph [0015] that more than one material of general formula (1) may be used. The present claims do not limit the composition of the light emitting layer to three materials, and do not limit valence electron level and/or conduction level and/or energy gap for any further materials that the light emitting layer may comprise.

With respect to relation (B') as set forth in present claim 26 and relation (B) as set forth in claim 37, based on the data provided in the Hosokawa patent and the present specification,

Sakai's Examples 1 and 2 inherently meet the EC0 vs. EC2 relationships, but do not meet EC0 ≥ EC1. Instead, the conduction level of Sakai's compound 6-1 is slightly smaller (by 0.07 eV) than the conduction level of DPVDPAN. (Sakai's compound 6-1 is Hosokawa's compound E2, and Sakai's DPVDPAN is Hosokawa's compound E1. Electron affinity correlates to conduction level.) However, the values are so similar that one of ordinary skill in the art at the time of the invention would have reasonably expected that devices wherein EC0 is only 0.07 eV less than EC1 would function in a similar manner to a device in which EC0=EC1 (as within the scope of present relations (B')/(B)), or in which EC0 is only slightly larger than EC1 (as within the scope of present relations (B')/(B)). In this regard, the examiner notes that there is insufficient data of record to demonstrate that devices meeting all claim limitations and in which the EC0 is the same as, or only slightly larger than, EC1, are unexpectedly superior to devices meeting all claim limitations except relation (B')/(B), but in which EC0 is only slightly smaller than EC1.

With respect to the further limitations of present claims 12 and 33, Sakai's bisanthracene compound 6-1, which is a phenylanthracene derivative, does not contain an alkenyl group. However, Sakai et al. do disclose a specific example of a bisanthracene compound that is a phenylanthracene derivative and contains an alkenyl group (Sakai's compound 4-19). Absent a showing of unexpected results, it is the examiner's position that it would have been within the level of ordinary skill of a worker in the art at the time of the invention to determine suitable substituted derivatives to provide a device within Sakai's guidelines.

4. Applicant's arguments filed May 21, 2010 have been fully considered but they are not persuasive.

Applicant argues that Sakai does not suggest the use of DPVDPAN in 20 wt% or less. Applicant argues that paragraph [0015] of Sakai suggests that DPVDPAN may be used in combination with another material, but does not suggest the use of DPVDPAN in 20 wt% or less. Applicant argues that paragraph [0033] suggests the content of DPVDPAN ranges from 40 to 100 %. Applicant argues that DPVDPAN is used as a host material rather than as a dopant in Sakai.

Applicant argues that differences in concentration are not obvious because there is evidence indicating such concentration is important to proper functioning of the invention.

Applicant further argues that Sakai does not disclose the use of two dopants. Applicant argues that the use of specific amounts of two dopants having specific valence electron levels, conduction levels and energy gaps relative to the light emitting material achieves an organic electroluminescence element having unexpectedly superior luminance, efficiency and durability as evidenced by certain Examples and Comparative Examples set forth in the specification.

While Sakai does not explicitly state that the amount of DPVDPAN may be 20 wt% or less in the light emitting layer, Sakai's disclosure is not limited to the use of DPVDPAN in amounts of greater than 20 wt% of the light emitting layer. While the weight ratios taught in paragraph [0033] are preferred, they are not required. Further, DPVDPAN is a light emitting material of Sakai's formula (1), and the device may comprise combinations of two or more compounds of formula (1). When combinations of two or more compounds of formula (1) are

used as the light emitting material, it would be readily apparent to one of ordinary skill in the art that the amount by weight of any or all of the individual compounds of formula (1) relative to the weight of the bis-condensed aromatic cyclic compound in the layer could be outside the range taught in paragraph [0033]. When combinations of two or more compounds of formula (1) are used as the light emitting material, and the total amount of light emitting material relative to the weight of the bis-condensed aromatic cyclic compound in the layer is at the low end of the range taught in paragraph [0033], the amount by weight of all of the individual compounds of formula (1) relative to the weight of the bis-condensed aromatic cyclic compound in the layer would necessarily be outside the range taught in paragraph [0033].

While Sakai's devices of Examples 1 and 2 utilize three materials in the light emitting layer, and the present claims require three materials in the light emitting layer, a light-emitting layer of a device according to Sakai's disclosure may comprise more than three materials just as the open language used to define the light emitting layer of the present claims allows for the light emitting layer to comprise more than the three recited materials. (Note that the examiner reads no limitations into terms such as "dopant" or "host".) The present claims set forth relative relationships for the valence electron level, conduction level and energy gap of the first and second dopants relative to the light-emitting-layer material, and place a lower limit on the energy gap of the first and second dopants, but no limit is placed on these properties for any further materials (i.e. materials other than the required three materials) that may be in the light emitting layer.

Regarding the wt% limitation and the evidence provided in the specification, the examiner maintains the position that the data of record do not demonstrate that the "20 wt% or less" limitation is critical, and do not demonstrate that the "20 wt% or less" limitation provides unexpected results compared to similar devices in which the content of one of the first and second dopants is greater than 20 wt% of the light emitting layer. The examples provide a comparison between devices within the scope of the present claims wherein the content of each of the first and second dopants is about 2 wt% of the layer, and devices in which the light emitting layer has only one of the required first or second dopants in an amount of about 2 wt% of the layer (the other dopant is not present). There is no evidence provided that demonstrates, for example, that a device according to the present claims provides unexpected results compared to a similar device in which the content of one of the first and second dopants is 20 wt% or less while the content of the other is greater than 20 wt%.

Applicant further argues that Sakai does not disclose the EC0 ≥ EC1 relationship of the present claims. Applicant states that the Office Action asserted that the prior art difference of 0.07 eV between EC0 and EC1 is obvious and that a person of ordinary skill in the art would expect that the device would function in a similar manner to a device in which EC0 = EC1. Applicant argues that because the conduction level of DPVDPAN is higher than that of the alleged light-emitting-layer material (i.e. Sakai's compound 6-1), DPVDPAN is not prevented from capturing electrons and driving voltage becomes high.

Further with respect to a difference of 0.07 eV between EC0 and EC1, applicant points to Comparative Example 3 in which only the claimed energy gap relationship is not satisfied and

the difference is 0.1 eV. Applicant argues that Comparative Example 3 exhibits significantly lower durability even though there is only a difference of 0.1 eV for the energy gap relationship.

The energy gap relationship in Comparative Example 3 does not demonstrate the criticality of, or unexpected results provided by, the claimed conduction level relationship between the light-emitting-layer material and the first dopant.

As noted in the rejection, there is insufficient data of record to demonstrate that devices meeting all claim limitations and in which the EC0 is the same as, or only slightly larger than, EC1, are unexpectedly superior to devices meeting all claim limitations except relation (B')/(B), but in which EC0 is only slightly smaller than EC1. In fact, the data of record appear to demonstrate that the EC0 ≥ EC1 limitation is not critical/does not provide unexpected results (e.g. see Example 4, in which EC0 is 0.3 eV less than EC1, but all other present claim limitations are met).

Applicant's arguments also refer to the claimed valence electron level relationship, implying that the claimed relationship of EV0 > EV1 is not satisfied by the materials of Sakai's Examples 1 and 2. The materials of Sakai's Examples 1 and 2 provide a difference between EV0 and EV1 of 0.02 eV as evidenced by the Hosokawa reference. (The examiner compared Sakai's compound 6-1 to the present light-emitting-layer material and Sakai's DPVDPAN to the present first dopant. Sakai's compound 6-1 is Hosokawa's compound E2, and Sakai's DPVDPAN is Hosokawa's compound E1.) Applicant argues that the EV0 > EV1 relationship is not met because the difference between EV0 and EV1 of 0.02 eV "would be trivial". This argument is not persuasive because the present independent claims merely require that EV0 be greater than

EV1, with no limit on the minimum value for the eV of the difference. Present claims 6 and 29 allow for a difference between EV0 and EV1 of "0.4 eV or less" (emphasis added), which encompasses a difference of 0.02 eV.

5. Applicant is advised that should claim 26 be found allowable, claim 7 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 7:00 a.m. to 3:30 p.m. Monday and Wednesday-Friday.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

/Marie R. Yamnitzky/
Primary Examiner, Art Unit 1786

MRY
July 15, 2010